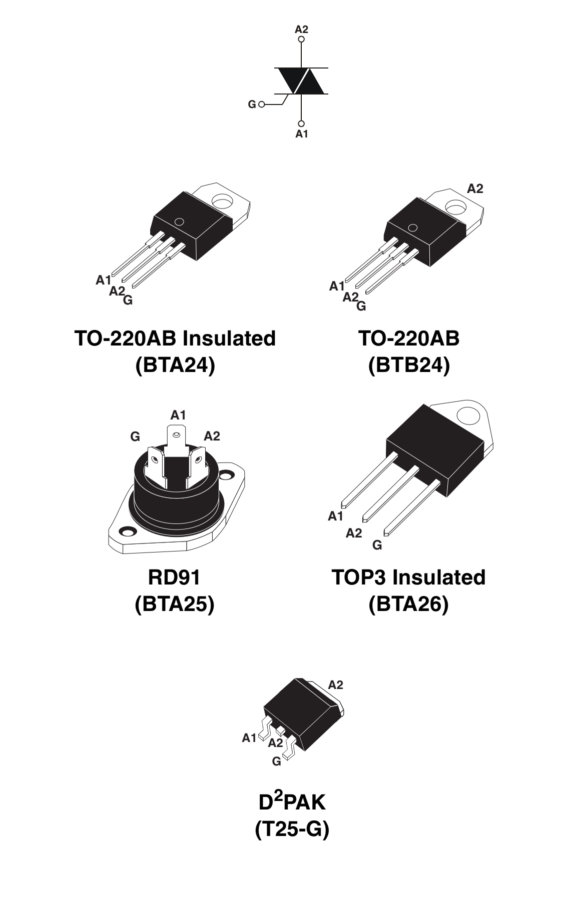
BTA24, BTB24, BTA25, BTA26 and T25 series

Snuberrless™ and Standard

25 A Triacs

Main features

Symbol	Value	Unit
$I_{T(RMS)}$	25	A
V_{DRM}/V_{RRM}	600 and 800	V
$I_{GT\ (Q_1)}$	35 to 50	mA



Description

Available either in through-hole or surface-mount packages, the **BTA24, BTB24, BTA25, BTA26** and **T25** triac series is suitable for general purpose AC switching. They can be used as an ON/OFF function in applications such as static relays, heating regulation, induction motor starting circuits... or for phase control operation in light dimmers, motor speed controllers, ...

The snubberless versions (BTA/BTB...W and T25 series) are specially recommended for use on inductive loads, thanks to their high commutation performances. By using an internal ceramic pad, the BTA series provides voltage insulated tab (rated at 2500V_{RMS}) complying with UL standards (File ref.: E81734).

Order codes

Part Number	Marking
BTA24-xxxxxRG	See *Table 6 on page 6*
BTB24-xxxxxRG	
BTA25-xxxxxRG	
BTA26-xxxxxRG	
T25xx-xxxG	
T25xx-xxxG-TR	

1 Characteristics

Table 1. Absolute maximum ratings

Symbol	Parameter			Value	Unit
$I_{T(RMS)}$	RMS on-state current (full sine wave)	D^2PAK / TO-220AB	T_c = 100° C	25	A
		RD91 / TOP3 Ins.	T_c = 90° C		
		TO-220AB Ins.	T_c = 75° C		
I_{TSM}	Non repetitive surge peak on-state current (full cycle, T_j initial = 25° C)	F = 50 Hz	t = 20 ms	250	A
		F = 60 Hz	t = 16.7 ms	260	
I^2t	I^2t Value for fusing	t_p = 10 ms		340	A^2s
dI/dt	Critical rate of rise of on-state current $I_G = 2 \times I_{GT}$, $t_r \leq 100$ ns	F = 120 Hz	T_j = 125° C	50	A/µs
V_{DSM}/V_{RSM}	Non repetitive surge peak off-state voltage	t_p = 10 ms	T_j = 25° C	V_{DSM}/V_{RSM} + 100	V
I_{GM}	Peak gate current	t_p = 20 µs	T_j = 125° C	4	A
$P_{G(AV)}$	Average gate power dissipation		T_j = 125° C	1	W
T_{stg} T_j	Storage junction temperature range Operating junction temperature range			- 40 to + 150 - 40 to + 125	° C

Table 2. Electrical characteristics (T_j = 25° C, unless otherwise specified), Snubberless™ and Logic Level (3 quadrants) T25-G, BTA/BTB24...W, BTA25...W, BTA26...W

Symbol	Test Conditions	Quadrant		T25	BTA/BTB		Unit
				T2535	CW	BW	
I_{GT} (1)	V_D = 12 V R_L = 33 Ω	I - II - III	MAX.	35	35	50	mA
V_{GT}		I - II - III	MAX.	1.3			V
V_{GD}	$V_D = V_{DRM}$ R_L = 3.3 kΩ T_j = 125° C	I - II - III	MIN.	0.2			V
I_H (2)	I_T = 500 mA		MAX.	50	50	75	mA
I_L	$I_G = 1.2\ I_{GT}$	I - III	MAX.	70	70	80	mA
		II		80	80	100	
dV/dt (2)	V_D = 67 %V_{DRM} gate open	T_j = 125° C	MIN.	500	500	1000	V/µs
(dI/dt)c (2)	Without snubber	T_j = 125° C	MIN.	13	13	22	A/ms

1. minimum I_{GT} is guaranted at 5% of I_{GT} max.
2. for both polarities of A2 referenced to A1.

Table 3. Electrical characteristics (T_j = 25° C, unless otherwise specified), Standard (4 quadrants), BTB24...B, BTA25...B, BTA26...B

Symbol	Test Conditions	Quadrant		Value	Unit
I_{GT} (1)	V_D = 12 V R_L = 33 Ω	I - II - III - IV	MAX.	50 100	mA
V_{GT}		ALL	MAX.	1.3	V
V_{GD}	$V_D = V_{DRM}$ R_L = 3.3 kΩ T_j = 125° C	ALL	MIN.	0.2	V
I_H (2)	I_T = 500 mA		MAX.	80	mA
I_L	I_G = 1.2 I_{GT}	I - III - IV	MAX.	70	mA
		II		160	
dV/dt (2)	V_D = 67 %V_{DRM} gate open	T_j = 125° C	MIN.	500	V/µs
(dV/dt)c (2)	(dI/dt)c = 13.3 A/ms	T_j = 125° C	MIN.	10	V/µs

1. minimum I_{GT} is guaranted at 5% of I_{GT} max.
2. for both polarities of A2 referenced to A1.

Table 4. Static characteristics

Symbol	Test Conditions			Value	Unit
V_T (1)	I_{TM} = 35 A t_p = 380 µs	T_j = 25° C	MAX.	1.55	V
V_{t0} (1)	Threshold voltage	T_j = 125° C	MAX.	0.85	V
R_d (1)	Dynamic resistance	T_j = 125° C	MAX.	16	mΩ
I_{DRM} I_{RRM}	$V_{DRM} = V_{RRM}$	T_j = 25° C	MAX.	5	µA
		T_j = 125° C		3	mA

1. for both polarities of A2 referenced to A1.

Table 5. Thermal resistance

Symbol	Parameter			Value	Unit
$R_{th(j-c)}$	Junction to case (AC)		D^2PAK / TO-220AB	0.8	° C/W
			RD91 (Insulated) / TOP3 Insulated	1.1	
			TO-220AB Insulated	1.7	
$R_{th(j-a)}$	Junction to ambient	(1)S = 1 cm^2	D^2PAK	45	° C/W
			TOP3 Insulated	50	
			TO-220AB / TO-220AB Insulated	60	

1. S = Copper surface under tab.

Figure 1. Maximum power dissipation versus RMS on-state current (full cycle)

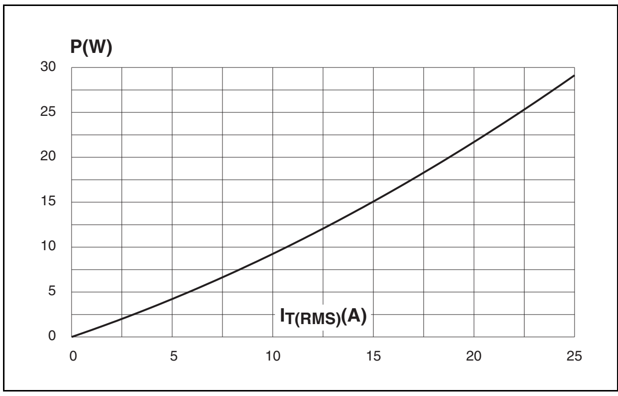


Figure 2. RMS on-state current versus case temperature (full cycle)

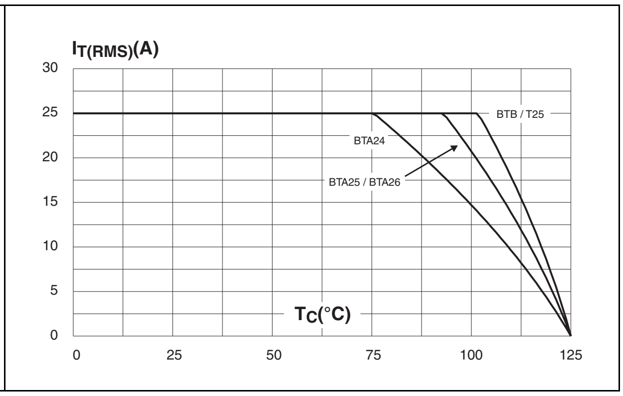


Figure 3. D^2PAK RMS on-state current versus ambient temperature (printed circuit board FR4, copper thickness: 35µm) (full cycle)

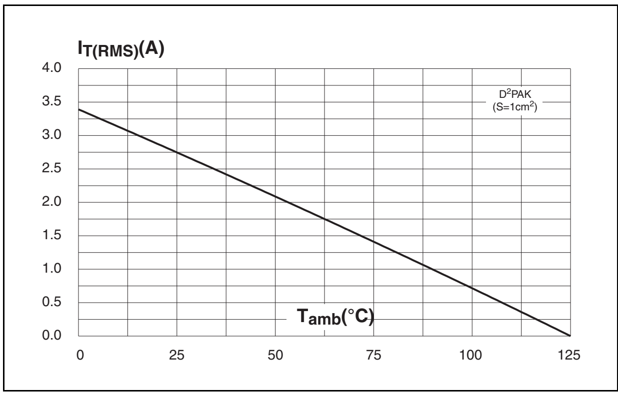


Figure 4. Relative variation of thermal impedance versus pulse duration

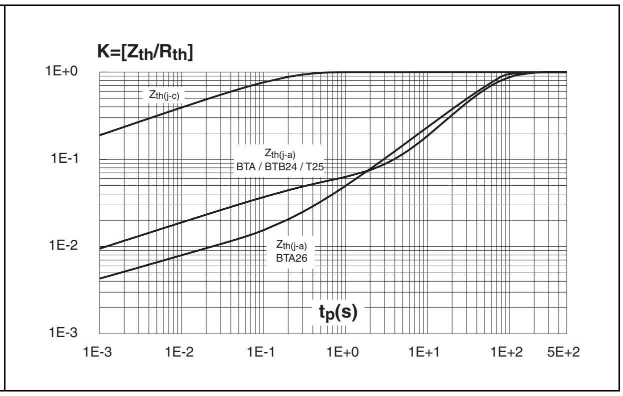


Figure 5. On-state characteristics (maximum values)

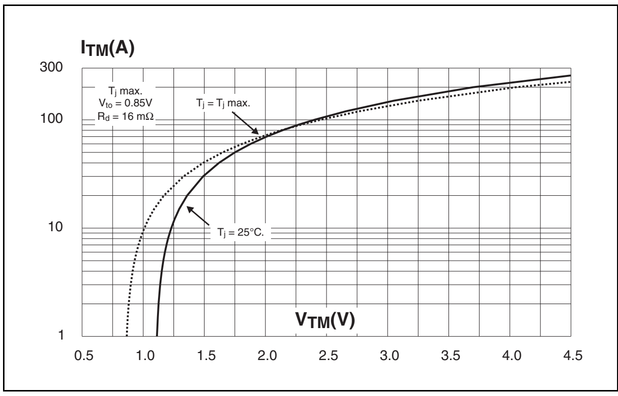


Figure 6. Surge peak on-state current versus number of cycles

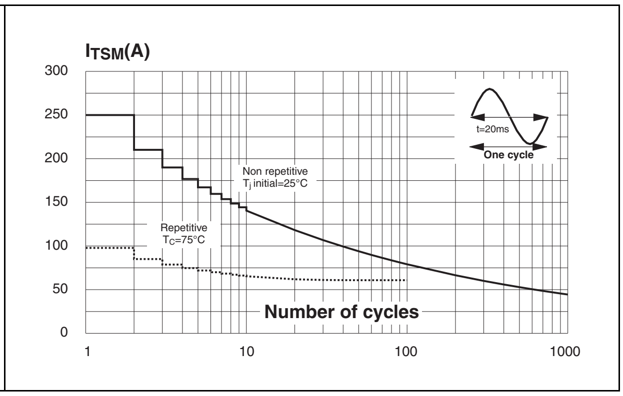


Figure 7. Non-repetitive surge peak on-state current for a sinusoidal pulse with width t_p < 10 ms and corresponding value of I^2t

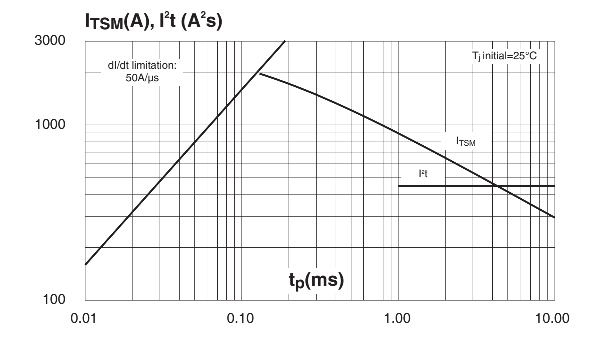


Figure 8. Relative variation of gate trigger current, holding current and latching current versus junction temperature (typical values)

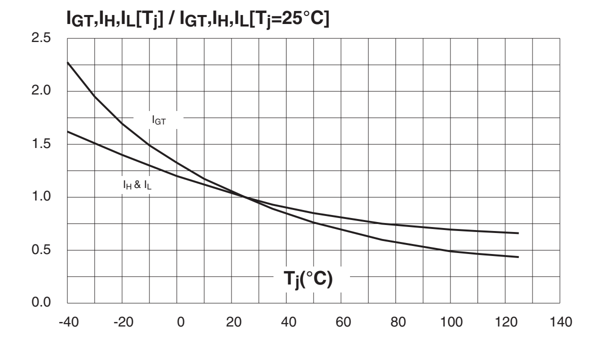


Figure 9. Relative variation of critical rate of decrease of main current versus (dV/dt)c (typical values)

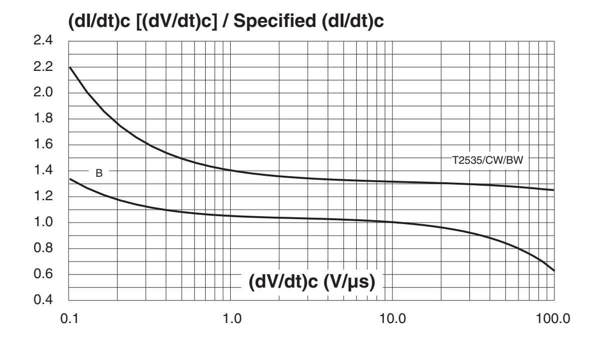


Figure 10. Relative variation of critical rate of decrease of main current versus (dV/dt)c

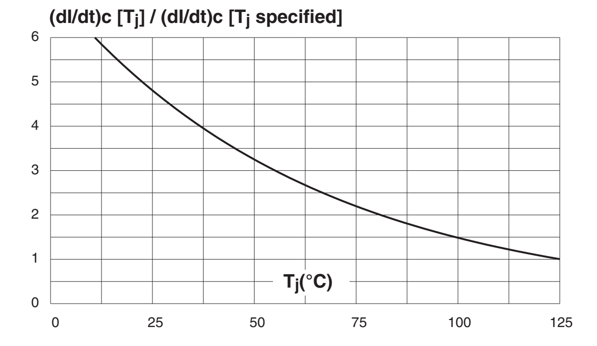
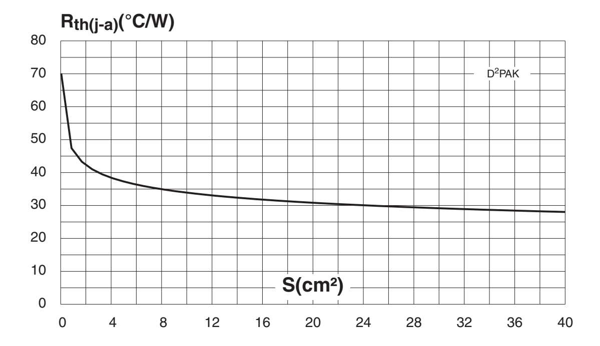


Figure 11. D^2PAK Thermal resistance junction to ambient versus copper surface under tab (printed circuit board FR4, copper thickness: 35 µm)



2 Ordering information scheme

Figure 12. BTA and BTB series

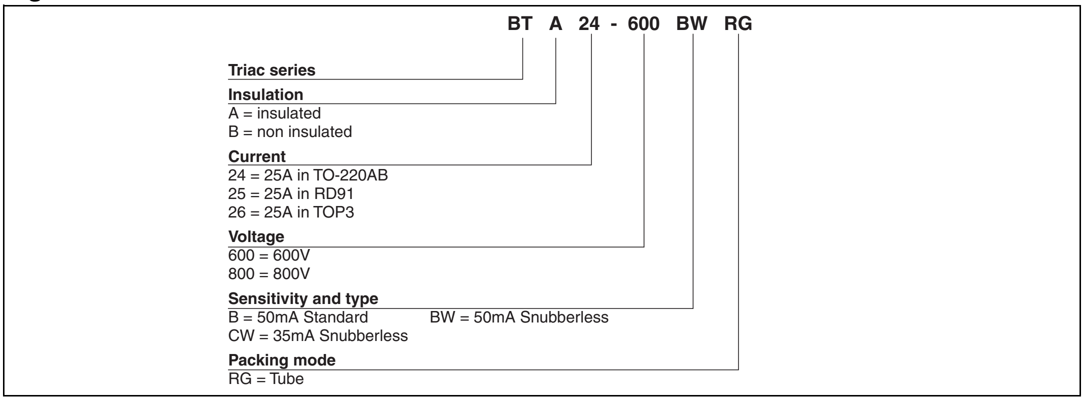


Figure 13. T25 series

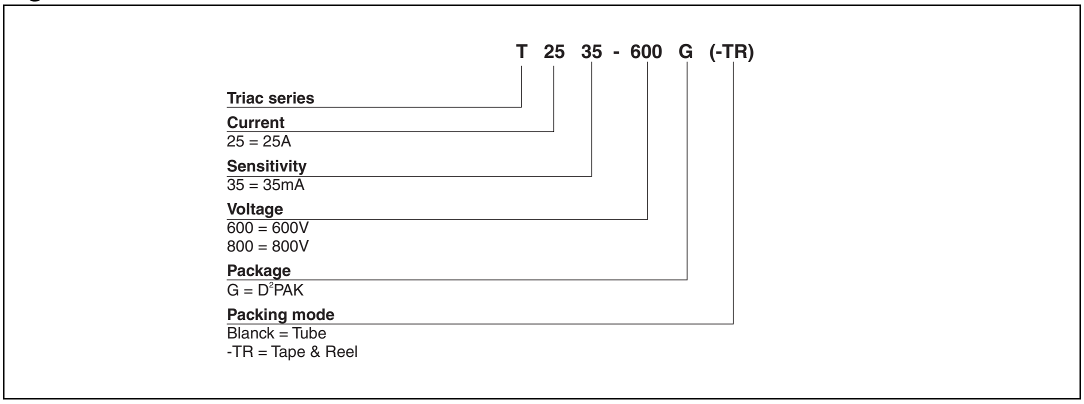


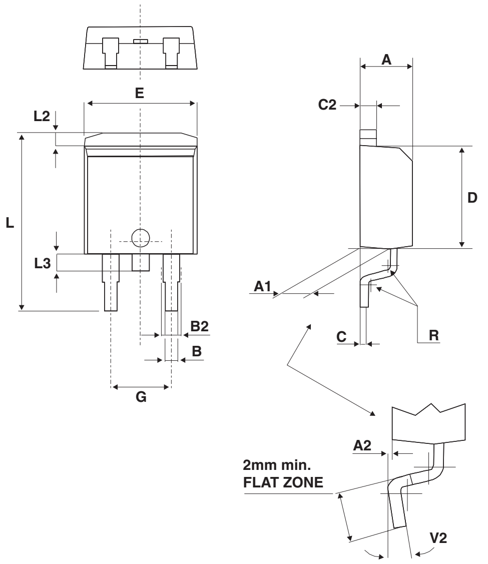
Table 6. Product Selector

Part Numbers	Voltage (xxx)		Sensitivity	Type	Package
	600 V	800 V			
BTA24-xxxBRG	X	X	50 mA	Standard	TO-220AB
BTA/BTB[1]24-xxxBWRG	X	X	50 mA	Snubberless	TO-220AB
BTA/BTB[1]24-xxxCWRG	X	X	35 mA	Snubberless	TO-220AB
BTA25-xxxBRG	X	X	50 mA	Standard	RD91
BTA25-xxxBWRG	X	X	50 mA	Snubberless	RD91
BTA25-xxxCWRG	X	X	35 mA	Snubberless	RD91
BTA26-xxxBRG	X	X	50 mA	Standard	TOP3 Ins.
BTA26-xxxBWRG	X	X	50 mA	Snubberless	TOP3 Ins.
BTA26-xxxCWRG	X	X	35 mA	Snubberless	TOP3 Ins.
T2535-xxxG	X	X	35 mA	Snubberless	D^{2}PAK

1. **BTB:** non insulated TO-220AB package

3 Package information

Table 7. D²PAK Package dimensions



REF.	DIMENSIONS					
	Millimeters			Inches		
	Min.	Typ.	Max.	Min.	Typ.	Max.
A	4.30		4.60	0.169		0.181
A1	2.49		2.69	0.098		0.106
A2	0.03		0.23	0.001		0.009
B	0.70		0.93	0.027		0.037
B2	1.25	1.40		0.048	0.055	
C	0.45		0.60	0.017		0.024
C2	1.21		1.36	0.047		0.054
D	8.95		9.35	0.352		0.368
E	10.00		10.28	0.393		0.405
G	4.88		5.28	0.192		0.208
L	15.00		15.85	0.590		0.624
L2	1.27		1.40	0.050		0.055
L3	1.40		1.75	0.055		0.069
R		0.40			0.016	
V2	0°		8°	0°		8°

Figure 14. D²PAK Foot Print Dimensions (in millimeters)

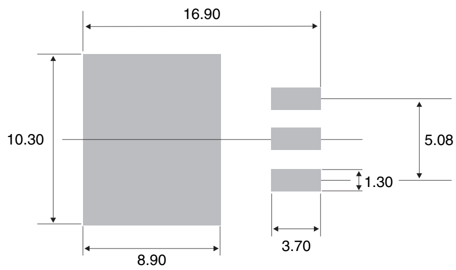
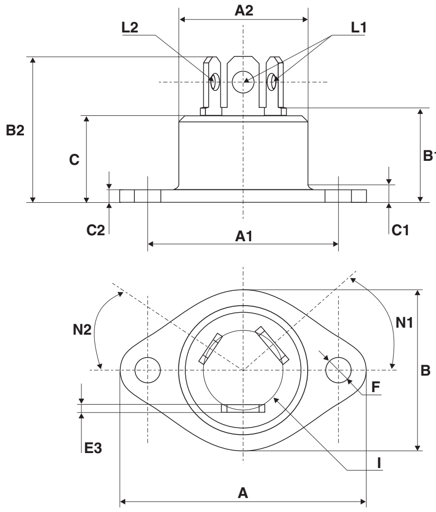
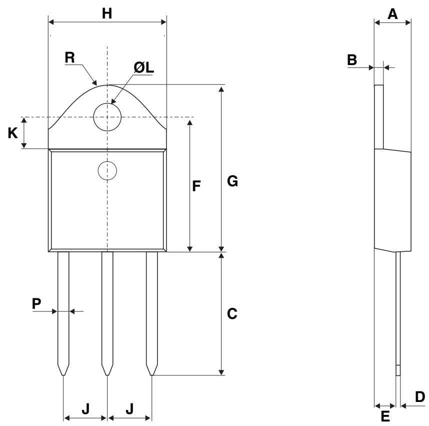


Table 8. RD91 Package dimensions



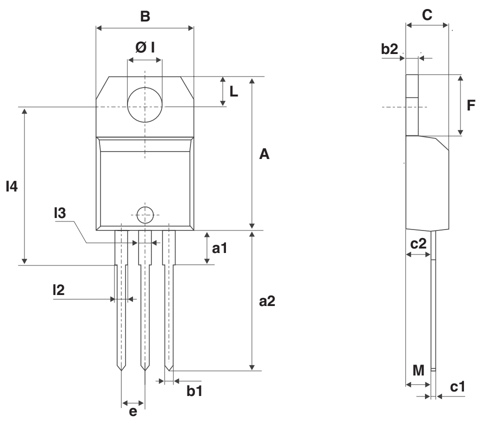
REF.	DIMENSIONS			
	Millimeters		Inches	
	Min.	Max.	Min.	Max.
A		40.00		1.575
A1	29.90	30.30	1.177	1.193
A2		22.00		0.867
B		27.00		1.063
B1	13.50	16.50	0.531	0.650
B2		24.00		0.945
C		14.00		0.551
C1		3.50		0.138
C2	1.95	3.00	0.077	0.118
E3	0.70	0.90	0.027	0.035
F	4.00	4.50	0.157	0.177
I	11.20	13.60	0.441	0.535
L1	3.10	3.50	0.122	0.138
L2	1.70	1.90	0.067	0.075
N1	33°	43°	33°	43°
N2	28°	38°	28°	38°

Table 9. TOP3 Insulated package dimensions



REF.	DIMENSIONS					
	Millimeters			Inches		
	Min.	Typ.	Max.	Min.	Typ.	Max.
A	4.4		4.6	0.173		0.181
B	1.45		1.55	0.057		0.061
C	14.35		15.60	0.565		0.614
D	0.5		0.7	0.020		0.028
E	2.7		2.9	0.106		0.114
F	15.8		16.5	0.622		0.650
G	20.4		21.1	0.815		0.831
H	15.1		15.5	0.594		0.610
J	5.4		5.65	0.213		0.222
K	3.4		3.65	0.134		0.144
ØL	4.08		4.17	0.161		0.164
P	1.20		1.40	0.047		0.055
R		4.60			0.181	

Table 10. TO-220AB (Insulated and non-insulated) Package dimensions



REF.	DIMENSIONS					
	Millimeters			Inches		
	Min.	Typ.	Max.	Min.	Typ.	Max.
A	15.20		15.90	0.598		0.625
a1		3.75			0.147	
a2	13.00		14.00	0.511		0.551
B	10.00		10.40	0.393		0.409
b1	0.61		0.88	0.024		0.034
b2	1.23		1.32	0.048		0.051
C	4.40		4.60	0.173		0.181
c1	0.49		0.70	0.019		0.027
c2	2.40		2.72	0.094		0.107
e	2.40		2.70	0.094		0.106
F	6.20		6.60	0.244		0.259
ØI	3.75		3.85	0.147		0.151
I4	15.80	16.40	16.80	0.622	0.646	0.661
L	2.65		2.95	0.104		0.116
I2	1.14		1.70	0.044		0.066
I3	1.14		1.70	0.044		0.066
M		2.60			0.102	

In order to meet environmental requirements, ST offers these devices in ECOPACK® packages. These packages have a lead-free second level interconnect. The category of second level interconnect is marked on the package and on the inner box label, in compliance with JEDEC Standard JESD97. The maximum ratings related to soldering conditions are also marked on the inner box label. ECOPACK is an ST trademark. ECOPACK specifications are available at: www.st.com.

4 Ordering information

Ordering type	Marking	Package	Weight	Base qty	Delivery mode
BTA/BTB24-xxxyyzRG	BTA/BTB24xxxyyz	TO-220AB	2.3 g	50	Tube
BTA25-xxxyyzRG	BTA25-xxxyyz	RD91	20 g	25	Bulk
BTA26-xxxyzRG	BTA26-xxxyyz	TOP3 Ins.	4.5 g	30	Tube
T2535-xxxG	T2535xxxG	D^2PAK	1.5 g	50	Tube
T2535-xxxG-TR	T2535xxxG			1000	Tape and reel

Note: xxx = voltage, yy = sensitivity, z = type

5 Revision History

Date	Revision	Description of Changes
Oct-2002	6A	Previous update.
13-Feb-2006	7	TO-220AB delivery mode changed from bulk to tube. ECOPACK statement added.
31-May-2006	8	Reformatted to current standard. T_c in figure 3 changed to T_{amb}
31-Jul-2006	9	Typing error corrected on page 1 (BTB124 instead of BTB24)